

BAKER (MICHAEL) JR INC BEAVER PA NATIONAL DAM SAFETY PROGRAM, LAKE HOLLY DAM (INVENTORY NUMBER V--ETC(U) MAY 81 C S ANDERSON F/G 13/13 DACV49-80-0-0032

DACW63-80-D-0032

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AL 100-3337

YORK RIVER BASIN
LEVEL

(1)

Name of Dam: Lake Hottel Dam

Location: Caroline County, Commonwealth of Virginia

Inventory Number: VA 03334

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM



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PREPARED FOR
NORFOLK DISTRICT CORPS OF ENGINEERS
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NORFOLK, VIRGINIA 23510

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20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Inspection is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspection. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the design flood should not be interpreted as necessarily posing a highly inadequate condition. The design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

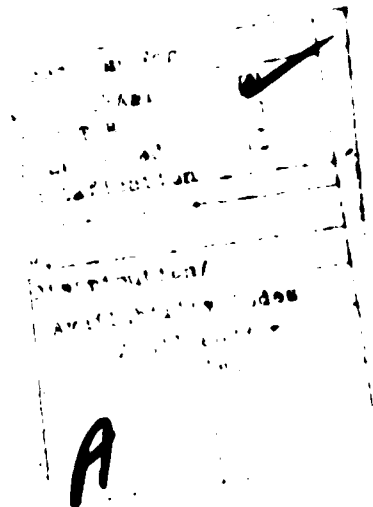
PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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NAME OF DAM: LAKE HOLLY DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Lake Holly Dam
State: Commonwealth of Virginia
County: Caroline
USGS 7.5 Minute Quadrangle: Penola, Virginia
Stream: Unnamed Tributary to the Maracossic Creek
Date of Inspection: 15 May 1981

BRIEF ASSESSMENT OF DAM

✓ Lake Holly Dam is an earthfill embankment approximately 20.7 feet high¹ and 365 feet long. The principal spillway is a corrugated metal pipe riser located near the center of the embankment. An emergency spillway is located on the right abutment.² The dam, located about 14.5 miles west of Sparta, Virginia, is used for recreation. The dam is owned by R.L. Stansberry, P.O. Box 245, Annandale, Virginia 22003. Lake Holly Dam is a "small" size - "significant" hazard structure as defined by the Recommended Guidelines for Safety Inspection of Dams. The dam and appurtenant structures were in good overall condition at the time of inspection. Maintenance of the dam is considered to be adequate. A stability check of the dam is not required.

✓ Using the Corps of Engineers' screening criteria for initial review of spillway adequacy, the 100-year flood was selected as the spillway design flood (SDF). The spillway is capable of passing up to 89 percent of the SDF or 21 percent of the Probable Maximum Flood (PMF) without overtopping the dam. Overtopping velocities are not considered to be seriously detrimental to the dam. The spillway is adjudged as inadequate, but not seriously inadequate.

Regular inspections should be made of the dam and appurtenant structures. A thorough check list should be compiled for use by the owner's representative as a guide for the inspections. Maintenance items should be completed annually.

The erosion of the upstream face of the dam should be monitored.

A formal warning system and emergency action plan should be developed and implemented as soon as possible.

¹Measured from the streambed at the downstream toe to the embankment crest.

²Facing downstream.

NAME OF DAM: LAKE HOLLY DAM

The following repair items should be accomplished as part of the general maintenance of the dam

- 1) Remove trees and debris from the outlet channel.
- 2) Backfill, compact, and protect from further erosion the scour area below the spillway outlet.
- 3) Remove the trees and brush from the embankment and downstream toe area by cutting them off at ground level. Trees with a trunk diameter greater than 3 inches should also have their root systems removed. The resulting holes should be backfilled, compacted, regraded, and seeded.
- 4) Place erosion protection in the emergency spillway.
- 5) Install a staff gage to monitor reservoir levels above normal pool.

MICHAEL BAKER, JR., INC. SUBMITTED

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Carl S. Anderson, Jr., P.E.
Acting Chief, Design Branch

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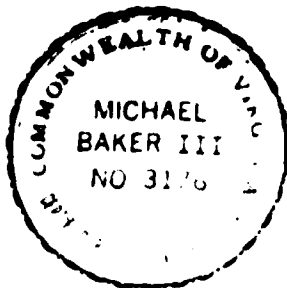
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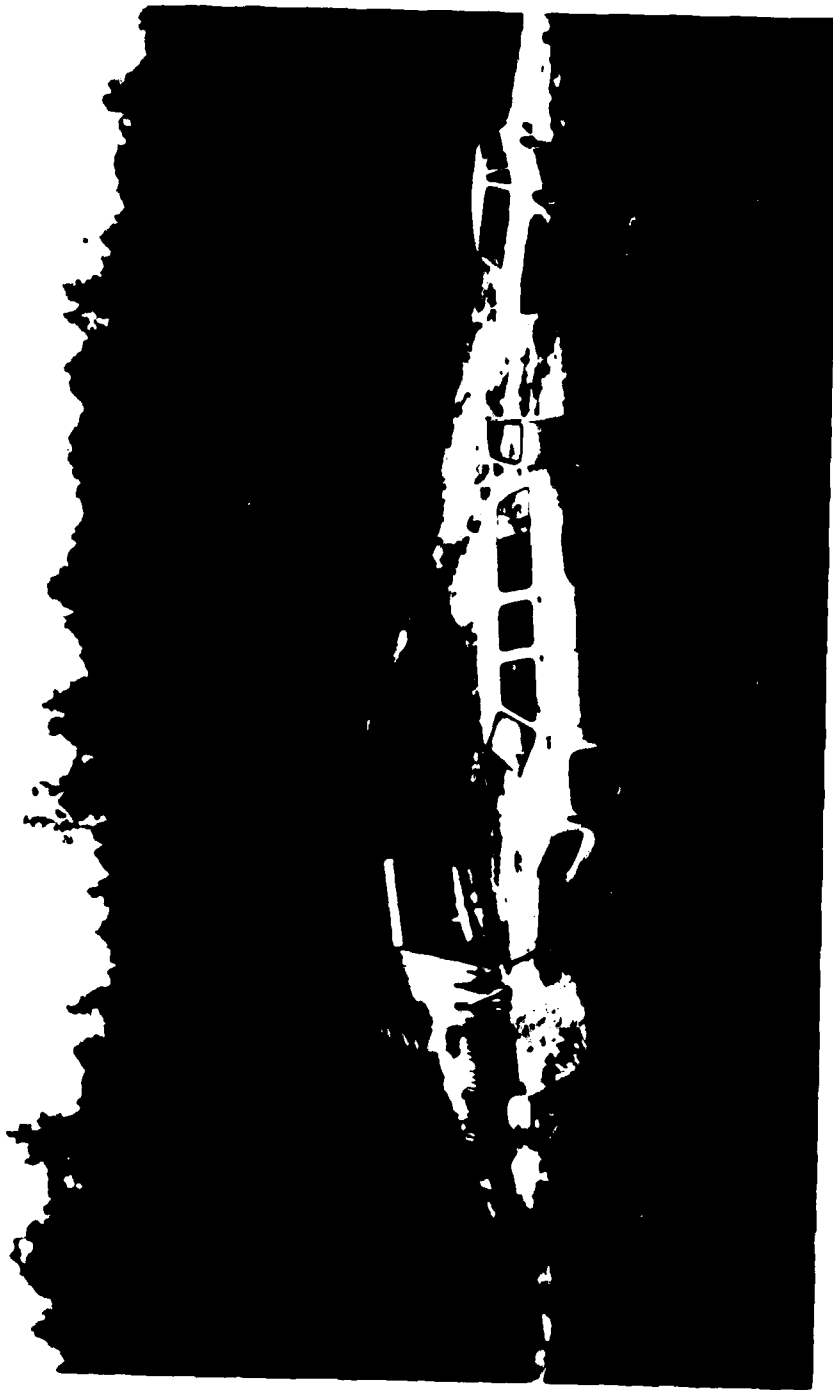
Original signed by:
Ronald E. Hudson
Ronald E. Hudson
Colonel, Corps of Engineers
District Engineer

Date:

SEP 1 1981



NAME OF DAM: LAKE HOLLY DAM



OVERALL VIEW OF DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM: LAKE HOLLY DAM ID# VA 03334

SECTION 1 - PROJECT INFORMATION

1.1 General

1.1.1 Authority: Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of safety inspections of dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (Reference 12, Appendix IV). The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Description of Project

1.2.1 Description of Dam and Appurtenances: Lake Holly Dam is an earthfill embankment approximately 20.7 feet high¹ and 365 feet long. The crest of the dam is about 12.5 feet wide, and the minimum crest elevation is 1006 feet Temporary Bench Mark (T.B.M.)². The slope of the upstream face of the embankment varies from 2.2H:1V (Horizontal to Vertical) to 3.4H:1V. The slope of the downstream face of the embankment varies from 3.0H:1V to 3.5H:1V. There is no information available on any possible zoning of the embankment or any foundation drainage system. A wooden breakwater was installed approximately two years ago to protect the upstream slope from erosion.

¹Measured from the streambed at the downstream toe to the embankment crest.

²All elevations are referenced to a Temporary Bench Mark located on top of the corrugated metal pipe intake riser. The assumed elevation is 1000.0 feet.

NAME OF DAM: LAKE HOLLY DAM

The principal spillway is located approximately 205 feet from the left abutment and 35 feet upstream from the crest of the dam. The spillway is comprised of two vertical sections of corrugated metal pipe (CMP). The first section is a 42-inch diameter CMP riser with a crest elevation of 1000.0 feet T.B.M. Attached to this section is a 1-1/2 foot section of 54-inch diameter CMP that extends the riser to an elevation of 1000.9 feet T.B.M. Water can enter the principal spillway at elevation 1000.0 feet T.B.M. by flowing between the two pipes, and at elevation 1000.9 feet T.B.M. by flowing over the 54-inch CMP. Water entering the principal spillway is carried through the embankment by means of a 30-inch diameter CMP that extends through the embankment to the downstream channel. The invert elevation at the outlet of this pipe is 986.9 feet T.B.M.

The water surface of the lake can be lowered 5 feet by a gate 21 inches high and 42 inches wide on the spillway riser. The gate is operated by a chain attached to the top of the gate.

The emergency spillway is located on the right abutment and is a trapezoidal shaped vegetated channel. The spillway is approximately 60 feet wide and has a crest elevation of 1003.7 feet T.B.M. A dirt roadway providing access to the dam and reservoir passes through the emergency spillway and ends at the upstream edge of the reservoir.

Lake Holly Dam has a drainage area of 1.16 square miles located south and west of the dam. Thelma Pitts Dam is located 2900 feet downstream. Thelma Pitts reservoir is 800 feet downstream of Lake Holly Dam.

- 1.2.2 Location: Lake Holly Dam is located in Caroline County, Virginia on an unnamed tributary of the Maracossic Creek, approximately 1.4 miles west of Sparta, Virginia. A Location Plan is included with this report in Appendix I.

NAME OF DAM: LAKE HOLLY DAM

1.2.3 Size Classification: The height of the dam is 20.7 feet, and the reservoir storage capacity at the crest of the dam (elevation 1006 feet T.B.M.) is 246 acre-feet. Therefore, the dam is in the "small" size category as defined by the Recommended Guidelines for Safety Inspections of Dams.

1.2.4 Hazard Classification: Thelma Pitts reservoir is located 800 feet downstream, and Thelma Pitts Dam is 2900 feet downstream from Lake Holly Dam. Virginia Route 654 crosses the downstream channel over a 4-foot diameter concrete culvert 3100 feet downstream. The Sparta Volunteer Fire Company house is located 4000 feet downstream in the floodplain. Loss of life in the event of dam failure is not considered highly probable. Economic losses due to damage of Thelma Pitts Dam, Virginia Route 654, the access road to the fire house, and the fire house are likely in the event of a dam failure. Lake Holly Dam is, therefore, considered to be in the "significant" hazard category as defined by the Recommended Guidelines for Safety Inspections of Dams. The hazard classification used to categorize dams is a function of location only and is not related to stability or probability of failure.

1.2.5 Ownership: The dam and reservoir are owned by the Commonwealth of Virginia, Department of Transportation, Division of Highways, and are located on Virginia Route 654.

1.2.6 Design and Construction: The dam was constructed in 1964 and is a gravity dam.

1.2.7 Design and Construction: The dam was constructed in 1964 and is a gravity dam. The dam was designed by the Virginia Department of Transportation, Division of Highways, and was constructed by the Virginia Department of Transportation, Division of Highways. The dam is a gravity dam and is located on Virginia Route 654.

1.2.8 Design and Construction: The dam was constructed in 1964 and is a gravity dam. The dam was designed by the Virginia Department of Transportation, Division of Highways, and was constructed by the Virginia Department of Transportation, Division of Highways. The dam is a gravity dam and is located on Virginia Route 654.

NAME: [REDACTED]

once a year for maintenance of the upstream face of the dam. No formal operating procedures are followed for this structure.

1.3 Pertinent Data

1.3.1 Drainage Area: The total drainage area contributing to Lake Holly Dam is 1.16 square miles.

1.3.2 Discharge at Dam Site: The maximum discharge is unknown.

Pool level at minimum top of dam:

Principal Spillway	70 c.f.s.
Emergency Spillway	816 c.f.s.

1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are provided in the following table:

TABLE 1.1 DAM AND RESERVOIR DATA

Name	Elevation (feet T.E.M.)	Area (acres)	Reservoir Capacity		Length (feet)
			Acre- feet	Watershed (inches)	
Top of Dam	1006.0	27.3	246.0	4.0	3310.0
Emergency Spillway	1003.0	20.9	188.0	3.0	3160.0
Principal Spillway	1000.0	14.4	123.0	2.0	2890.0
Minimum Pool	985.3	-	-	-	-

NAME OF DAM: LAKE HOLLY DAM

SECTION 2 - ENGINEERING DATA

- 2.1 Design: Design plans, specifications, and boring logs were not available for use in preparing this report. No stability analyses or hydrologic and hydraulic data were available for review.
- 2.2 Construction: Construction records, as-built plans, and inspection logs were not available for review.
- 2.3 Evaluation: There is insufficient information to evaluate foundation conditions and embankment stability. No design or construction records were available for use in assessing the condition of the dam. All evaluations and assessments in this report were based upon field observations, conversations with the owner, and office analyses.

NAME OF DAM. LAKE HOLLY DAM

SECTION 3 - VISUAL INSPECTION

3.1 Findings

3.1.1 General: The field inspection was conducted on 15 May 1981. At the time of the inspection the pool elevation was 1000+ feet T.B.M., the tailwater elevation was 986+ feet T.B.M., and the weather was clear with a temperature of 70 degrees Fahrenheit. The ground surface on the embankment and the abutments were dry. The dam and appurtenant structures were found to be in good overall condition at the time of the inspection. Deficiencies found during the inspection will require remedial treatment. The following are brief summaries of these deficiencies. A Field Sketch of conditions found during the inspection is presented as Plate 1 in appendix I. The complete visual inspection check list is provided in Appendix III. No record was found of any previous inspections.

3.1.2 Dam: The embankment was found to be in generally good condition with no surface cracks or slides observed. The embankment is vegetated with grass. There are trees and brush growing at scattered locations on the downstream face of the dam. This growth is particularly dense along the downstream toe. The upstream face of the embankment was slightly eroded at normal pool level. A wooden breakwater was installed to help minimize the erosion.

3.1.3 Appurtenant Structures: The principal spillway (as described in Section 1.2.1) was found to be in good condition. The area downstream from the outlet pipe has been scoured out by discharge through the outlet pipe.

The emergency outlet gate consists of the 21-inch by 41-inch gate that is opened by means of a chain. The gate was submerged at the time of the inspection and could not be observed.

NAME OF DAM LAKE HULLY DAM

The approach area to the emergency spillway is broad and unobstructed. The approach area consists of natural ground and reservoir bottom with little vegetation. The discharge channel is not well defined downstream of the crest. A dirt roadway providing access to the dam and reservoir passes through the emergency spillway and ends at the upstream edge of the reservoir.

3.1.4 Reservoir Area. The area surrounding the reservoir is mildly sloping. The slopes are wooded and in good condition with no evidence of erosion. Soundings at the time of the inspection show the water to be 12 feet deep at a distance of 100 feet from shore near the center of the embankment. No significant accumulations of debris were observed in the reservoir area.

3.1.5 Downstream Channel. The downstream channel has very mild slopes. The channel is overgrown with trees and brush and contains some debris. The stream enters Thelma Pitts reservoir (ID No. VA 03343) about 800 feet downstream. Approximately 200 feet below Thelma Pitts reservoir, the stream passes under Virginia Route 654 through a 4-foot diameter culvert. An additional 600 feet downstream the channel passes through a 4-foot diameter culvert under the access road at the Sparta Volunteer Fire Company.

3.1.6 Instrumentation. There was no instrumentation present at the dam.

3.2 Evaluation. In general, the dam and appurtenant structures were in good condition. The outlet channel should be cleared of trees and debris. The scoured area near the outlet pipe should be repaired and protected from further erosion. Erosion protection should be provided for the emergency spillway. The erosion of the upstream face is not considered to be a serious problem at this time but should be monitored. The trees and brush should be removed from the embankment and area along the downstream toe.

A staff gage should be installed to monitor reservoir levels above normal pool.

NAME OF DAM LAKE HULLY DAM

SECTION 4 - OPERATIONAL PROCEDURES

- 4.1 Procedures: Operation of the dam is an automatic function controlled by the principal spillway. Water entering the reservoir flows into the principal spillway at elevation 1000.0 feet T.B.M. The emergency spillway is activated when the reservoir level rises above 1003.7 feet T.B.M. The reservoir can be lowered approximately 5 feet to elevation 995.0 feet T.B.M. by the operation of the gate on the principal spillway.
- 4.2 Maintenance of Dam: Maintenance of the dam is the responsibility of the owner. An inspection or maintenance schedule has not been instituted.
- 4.3 Maintenance of Operating Facilities: The operating facility is the gate which lowers the reservoir 5 feet. The owner is responsible for maintenance of this facility. A formal inspection schedule has not been instituted.
- 4.4 Warning System: At the time of inspection, there was no warning system or emergency plan in operation.
- 4.5 Evaluation: Maintenance of the dam in the past has been adequate. Regular inspections of the dam and appurtenant structures should be made and documented. A thorough check list should be compiled for use by the owner's representative as a guide for the inspections. Maintenance items should be corrected annually. A warning system and emergency action plan should be developed and implemented as soon as possible. The plan should include:
 - a. How to operate the dam during an emergency.
 - b. Who to notify, including public officials, in case evacuation from the downstream area becomes necessary.

The local Emergency Services Coordinator of the State Office of Energy and Emergency Services can assist in the preparation of an emergency warning plan.

NAME OF DAM: LAKE HOLLY DAM

SECTION 5 - HYDRAULIC/HYDROLOGIC DATA

- 5.1 Design: No design data were available for use in preparing this report.
- 5.2 Hydrologic Information: No rainfall, stream gage or reservoir stage records are maintained for this dam.
- 5.3 Flood Experience: No records were available.
- 5.4 Flood Potential: The Probable Maximum Flood (PMF), 1/2 Probable Maximum Flood (1/2 PMF), and 100-year flood were developed and routed through the reservoir by use of the HEC-1 DB computer program (Reference 9, Appendix IV) and appropriate unit hydrograph, precipitation and storage-outflow data. Clark's T_c and R coefficients for the local drainage areas were estimated from basin characteristics. The rainfall applied to the unit hydrograph was taken from publications by the U.S. Weather Bureau and the National Oceanic and Atmospheric Administration (References 16 and 17, Appendix IV). Rainfall losses for the PMF were estimated at an initial loss of 1.0 inch and a constant loss rate of 0.05 inch per hour thereafter. Rainfall losses for the 100-year flood were estimated at an initial loss of 1.5 inches and a constant loss rate of 0.15 inch per hour thereafter.
- 5.5 Reservoir Regulation: Pertinent dam and reservoir data are provided in Table 1.1, Paragraph 1.3.3.

Regulation of flow from the reservoir is automatic. Normal flows are maintained by the crest of the principal spillway at elevation 1000.0 feet T.B.M. Some manual regulation of flow is possible by opening the gate on the riser pipe. By opening this gate, the water surface can be lowered to 995.0 feet T.B.M. Water may also be discharged through the emergency spillway when the reservoir rises above elevation 1003.7 feet T.B.M.

Outlet discharge capacity was computed by hand. Reservoir area was estimated from the Fenola, Virginia, 7.5 minute USGS quadrangles, and storage capacity curves above normal pools were computed by the HEC-1 DB program. All flood routings began with the reservoir at normal pool (1000.0 feet T.B.M.). Flow through the principal spillway was included in the routings.

NAME OF DAM LAKE H LLY DAM

- 5.6 Overtopping Potential: The probable rise of the reservoir and other pertinent information on reservoir performance are shown in the following table:

TABLE 5.1 RESERVOIR PERFORMANCE

Item	Normal ¹	Hydrographs		
		100-Year flood	1/2 PMF	PMF ²
Peak flow, c.f.s.				
Inflow	1.0	2235.0	5829.0	11,657.0
Outflow	1.0	1398.0	5416.0	11,066.0
Peak elev., ft. T.B.M.	1000.0	1006.8	1008.9	1,010.4
Non-overflow section (elev. 1006.0 ft. T.B.M.)				
Depth of flow, ft.	-	0.8	2.9	4.4
Average velocity, f.p.s. ³	-	4.1	7.9	9.7
Total duration of over- topping, hrs.	-	1.2	3.8	5.5
Tailwater elev., ft. T.B.M.	985.3	-	-	-

¹Conditions at time of inspection.

²The PMF is an estimate of flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in a region.

³Velocity estimates were based on critical depth at control section.

- 5.7 Reservoir Emptying Potential: The reservoir can be lowered 5 feet by opening the gate on the primary spillway. Neglecting inflow, the reservoir can be drawn down 5 feet from normal pool in approximately 60 hours. This is equivalent to an approximate drawdown rate of 2.0 feet per day, based on the hydraulic height measured from normal pool to the spillway gate divided by the time to lower the reservoir 5 feet.

- 5.8 Evaluation: Lake Holly Dam is a "small" size - "significant" hazard dam requiring evaluation for a spillway design flood (SDF) in the range of the 100-year flood to the 1/2 PMF. Due to the risk involved, the 100-year flood was selected as the SDF. The 100-year flood was routed through the reservoir and found to overtop the dam by a maximum depth of 0.8 feet with an average

NAME OF DAM LAKE HOLLY DAM

critical velocity of 4.1 feet per second (f.p.s.).
Total duration of dam overtopping would be 1.2 hours.
The spillways are capable of passing up to 21 percent
of the PMF or 89 percent of the SDF without overtopping
the dam.

Conclusions pertain to present day conditions, and the
effect of future development on the hydrology has not
been considered.

NAME OF DAM: LAKE HOLLY DAM

SECTION 6 - DAM STABILITY

6.1 Foundation and Abutments: No information is available on foundation conditions other than observations made at the time of the inspection. The dam is located in the Atlantic Coastal Plain geologic region, and the predominant deposit in the area of the dam is Tertiary Age Calvert Formation consisting of interbedded sand and clay. The Geologic Map of Virginia also shows Quaternary-age upland gravel and sand existing at the surface of the area.

6.2 Embankment

6.2.1 Materials: There was no information describing the nature of the materials or any zoning within the embankment. However, Mr. R.L. Stansberry, the present owner, reports a clay core does exist within the embankment. The outer embankment was found to be fine to very fine grained sand with some traces of silt.

6.2.2 Stability: Design plans and previous stability analysis results were unavailable for this inspection. The dam is 20.7 feet high with a crest width of 12.5 feet. The upstream slope was measured to vary from 2.2H:1V to 3.4H:1V. The downstream slope was measured to be 3.1H:1V. The outlet facilities provide the capability to drain the reservoir 5 feet in the event of an emergency or for maintenance purposes. As presented in Section 5.7, the maximum possible drawdown rate is 2 feet per day. Therefore, if not regulated, a rapid drawdown situation is possible.

According to the guidelines presented in Design of Small Dams by the U.S. Department of the Interior, Bureau of Reclamation, for small dams of the described material with stable foundations subject to rapid drawdown, the recommended side slopes are 3.5H:1V for the upstream face and 2.5H:1V for the downstream face. The recommended crest width is 14.0 feet. The downstream slope is within these guidelines while the upstream slope is steeper and the crest width is narrower than recommended.

NAME OF DAM: LAKE HOLLY DAM

Other than the minor erosion occurring on the upstream face of the embankment along normal pool level, no signs of instability were observed.

6.2.3 Seismic Stability: The dam is located in Seismic Zone I, which presents no hazard from earthquakes according to the Recommended Guidelines for Safety Inspection of Dams by the Department of the Army, Office of the Chief of Engineers. This determination is contingent on the requirements that static stability conditions are satisfactory and conventional safety margins exist.

6.3 Evaulation: The results of previous stability analyses were unavailable for review for this report. The downstream slope is within the Bureau of Reclamation guidelines, while the upstream slope is steeper and the crest width is narrower than the recommended values. However, no significant signs of instability were noted.

As described in Section 5 of this report, the dam would be overtopped by the SDF. Despite the inability of the spillway to pass the SDF, the depth, and duration, and rate of overtopping are not considered to be seriously detrimental to the embankment. Overtopping flows are shallow and last only 1.2 hours, and the velocity is less than 6.0 f.p.s., the effective eroding velocity for a vegetated earth embankment. A stability check is not required.

NAME OF DAM: LAKE HOLLY DAM

SECTION 7 - ASSESSMENT, REMEDIAL MEASURES

- 7.1 Dam Assessment: There is insufficient information to evaluate foundation conditions and embankment stability. There was no engineering data available for use in preparing this report. Deficiencies discovered during the field inspection and the office analyses require remedial treatment. The dam and appurtenant structures are generally in good condition. Maintenance is considered adequate. A stability check of the dam is not required.

Using the Corps of Engineers' screening criteria for initial review of spillway adequacy, the 100-year flood was selected as the SDF for the "small" size - "significant" hazard classification of Lake Holly Dam. The spillway is capable of passing up to 89 percent of the SDF or 21 percent of the PMF without overtopping the non-overflow section of the dam. The SDF was found to overtop the dam by a maximum depth of 0.8 feet with an average critical velocity of 4.1 feet per second (f.p.s.). The overtopping flows are not considered to be seriously detrimental to the embankment. Therefore, the spillway is adjudged as inadequate, but not seriously inadequate.

There is no flood warning system or emergency action plan currently in operation.

- 7.2 Recommended Remedial Measures: Regular inspections should be made of the dam and appurtenant structures. A thorough check should be compiled for use by the owner's representative as a guide for the inspections. Maintenance items should be completed annually.

The erosion of the upstream face of the embankment should be monitored.

A formal warning system and emergency action plan should be developed and implemented as soon as possible.

The following repair items should be accomplished as part of the general maintenance of the dam.

- 1) Remove trees and debris from the outlet channel.
- 2) Backfill, compact, and riprap the scour area below the spillway outlet.

NAME OF DAM: LAKE HOLLY DAM

- 3) Remove the trees and brush from the embankment and downstream toe area by cutting them off at ground level. Trees with a trunk diameter greater than 3 inches should also have their root systems removed and the resultant holes backfilled, compacted, regraded, and seeded.
- 4) Place erosion protection in the emergency spillway.
- 5) Install a staff gage to monitor reservoir levels above normal pool.

NAME OF DAM: LAKE HOLLY DAM

APPENDIX I

PLATES

CONTENTS

Location Map

Plate 1. Elevation

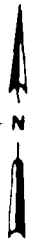
Plate 2. Top of Dam Profile

Plate 3. Typical Cross Section

NAME OF DAM LAKE HULLY DAM

LAKE HOLLY
DAM

VA.



Mardessie Creek

LAKE HOLLY DAM

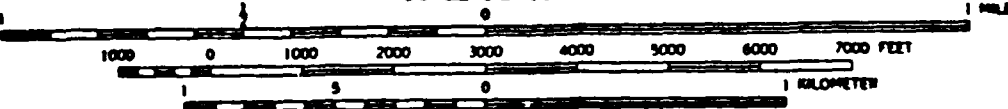
Chenaults Shop

Collins Pond

Cem. Holy Trinity Ch.

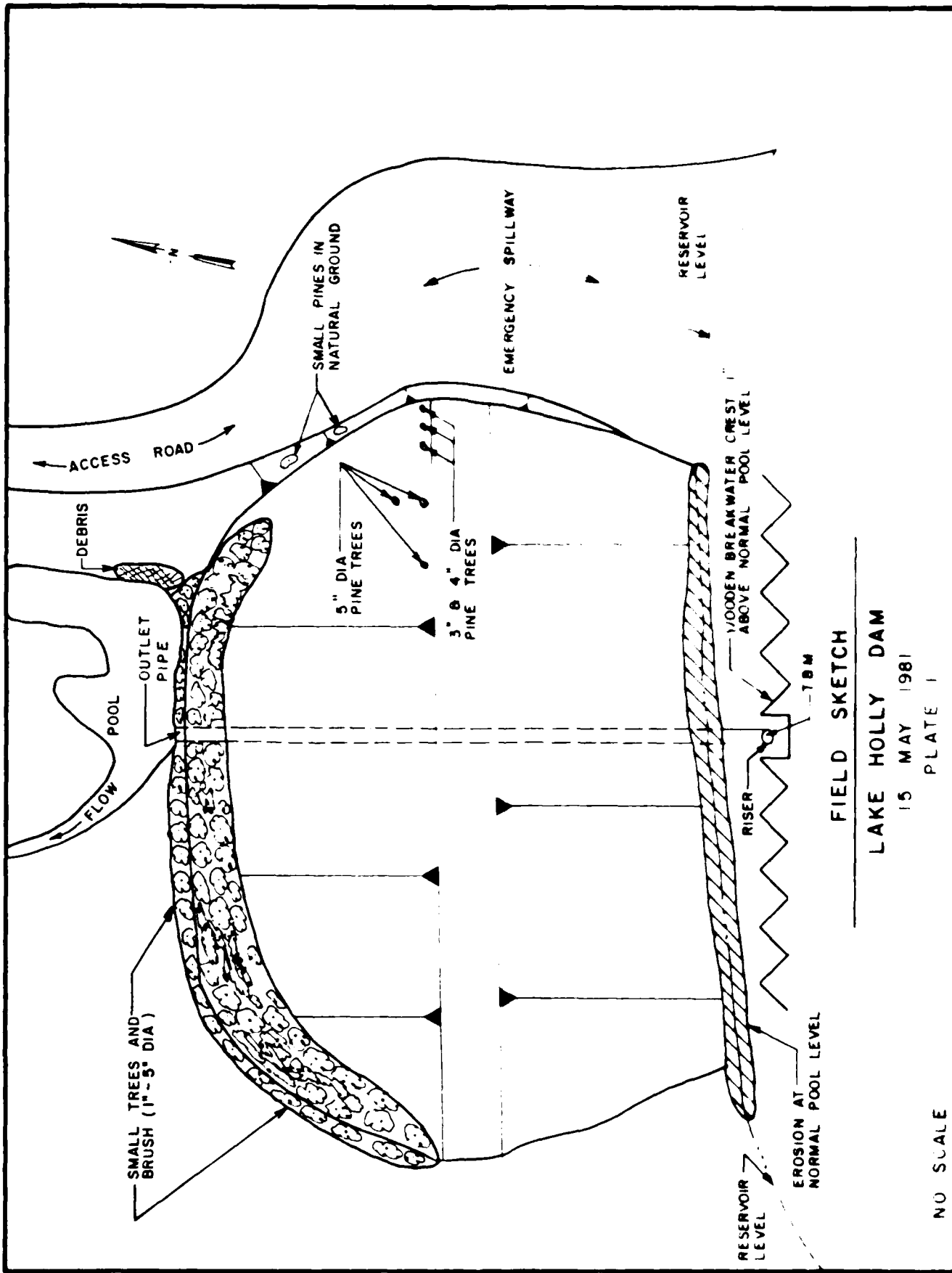
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LOCATION PLAN
LAKE HOLLY DAM

REFERENCES
1 USGS 7.5' PENOLA, VA.
QUADRANGLE (1969)



FIELD SKETCH

LAKE HOLLY DAM

15 MAY 1981

PLATE 1

NO SCALE

STATE OF TEXAS
COUNTY OF DALLAS

PROJECT: DALLAS COUNTY

S.O. No.

DATE OF SURVEY: 1954

Sheet No. 1 of 1

PREPARED BY: [Name]

Drawing No.

Computed by:

Checked by: [Name]

Date: 12-15-54

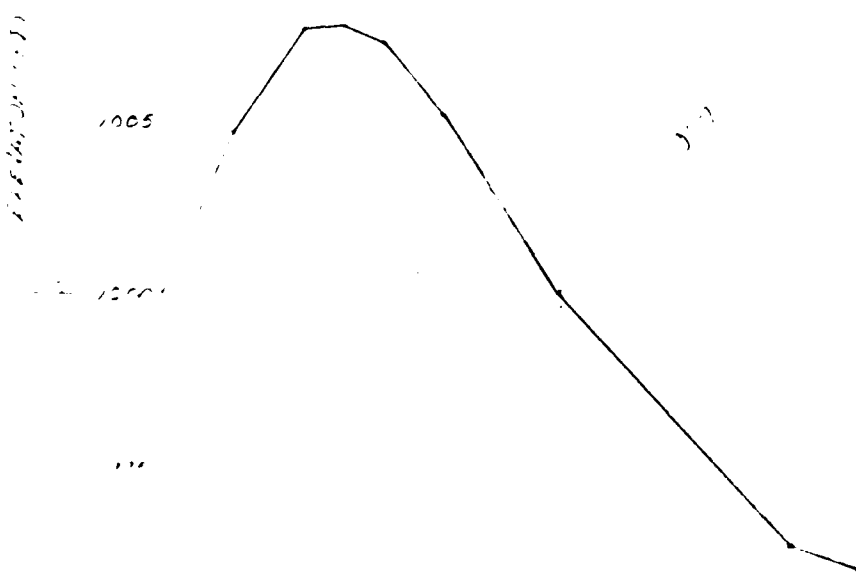
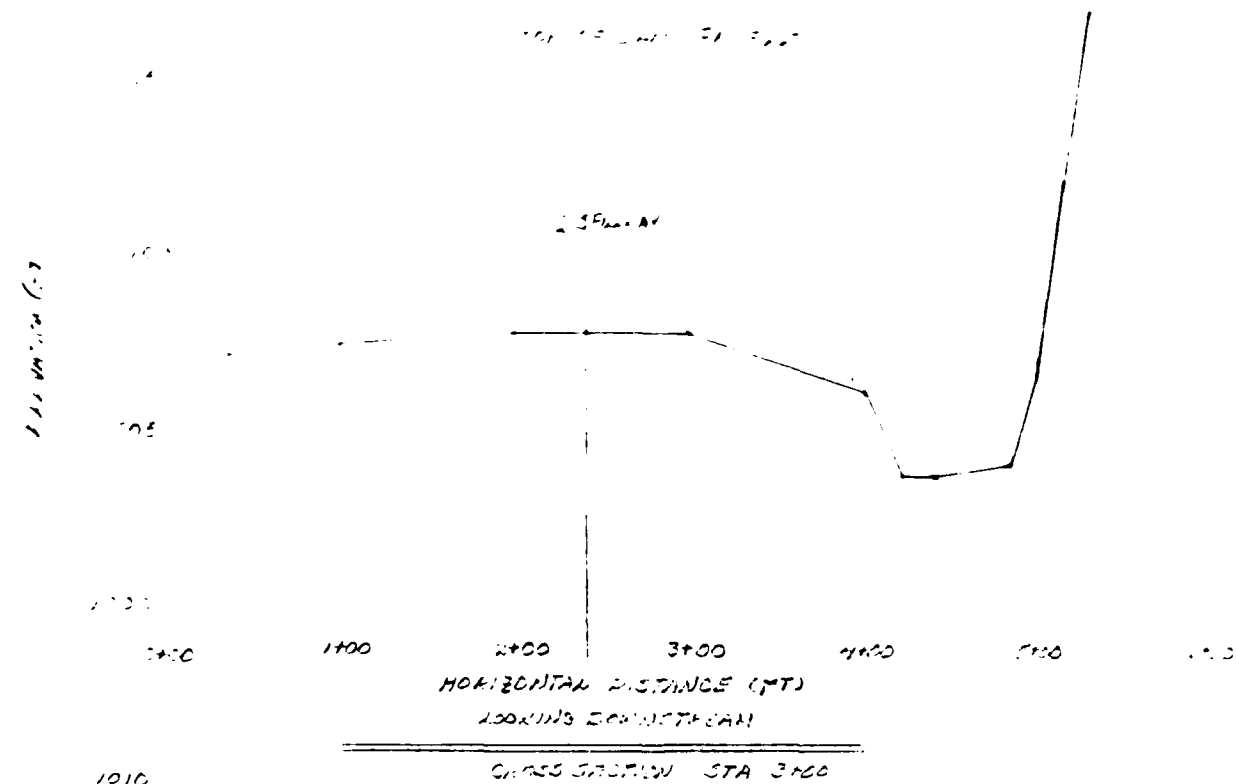


PLATE 2

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APPENDIX II
PHOTOGRAPHS

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- Photo 1: Upstream Face of Embankment
- Photo 2: Downstream Face of Embankment
- Photo 3; Riser Intake and Wooden Breakwater
- Photo 4: Outlet Pipe
- Photo 5: Erosion of Upstream Face
- Photo 6: Emergency Spillway Channel (Looking Upstream)

Note: Photographs were taken on 15 Many 1981.

NAME OF DAM: LAKE HOLLY DAM

LAKE HOLLY DAM



PHOTO 1. Upstream Face of Embankment



PHOTO 2. Downstream Face of Embankment

LAKE HOLLY DAM



PHOTO 3. Riser Intake and Wooden Breakwater



PHOTO 4. Outlet Pipe

LAKE HOLLY DAM

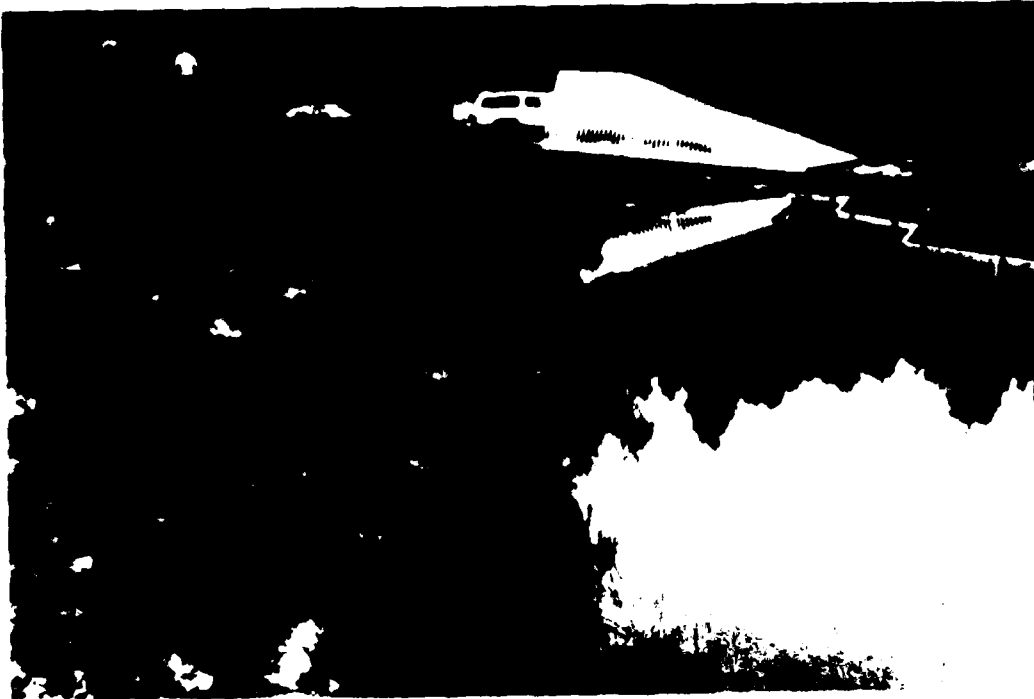


PHOTO 5. Erosion of Upstream Face



PHOTO 6. Emergency Spillway Channel (Looking Upstream)

APPENDIX III
VISUAL INSPECTION CHECK LIST

Check List
Visual Inspection
Phase 1

Name of Dam Lake Holly Dam County Caroline State Virginia Coordinates Lat. 3759.1
Long. 7715.3

Date of Inspection 15 May 1981 Weather Sunny Temperature 70°F.

Pool Elevation at Time of Inspection 1000.+ T.B.M. Tailwater at Time of Inspection 986.7 T.B.M.

Inspection Personnel:

Michael Baker, Jr., Inc.:

Wayne D. Lasch
Steve M. Lockington
Dave W. Miller

Owner's Representatives:

Mr. R. L. Stansberry
Virginia State Water Control
Board

Hugh Gildea
Leon Musselwhite

Wayne D. Lasch Recorder

EMBANKMENT

Name of Dam LAKE HOLLY DAM

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|--|---|---|
| SURFACE CRACKS | The ground surface of the embankment and the abutments were dry. No surface cracks were observed. | |
| UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE | None were observed. | |
| SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES | A limited amount of erosion was observed on the upstream face of the embankment at normal pool level. The owner installed a wooden breakwater in the reservoir immediately upstream from the dam to minimize the progression of this erosion. The breakwater was installed two years ago. | The erosion is not considered to be a major problem at this time. However, it should be monitored and, if it becomes more serious, erosion protection should be placed on the upstream face of the dam. |

EMBANKMENT

Name of Dam LAKE HOLLY DAM

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|----------------------------|----------------------------|
| VERTICAL AND HORIZONTAL
ALIGNMENT OF THE CREST | No problems were observed. | |
| RIPRAP FAILURES | This is not applicable. | |
| | | |
| | | |

EMBANKMENT

Name of Dam LAKE HOLLY DAM

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|--|
| JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM | There are trees and brush growing at scattered locations on the embankment. This growth is particularly dense above the downstream toe. No other problems observed. | The trees and brush should be removed. |
| ANY NOTICEABLE SEEPAGE | No seepage was observed. | |
| STAFF GAGE AND RECORDER | There were none. | A staff gauge should be installed to monitor reservoir levels above normal pool. |
| DRAINS | There were none. | |

OUTLET WORKS

Name of Dam: LAKE HOLLY DAM

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|--|---|--|
| CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT | This is not applicable. | |
| INTAKE STRUCTURE | <p>The intake structure consists of a 42 in. diameter CIP riser unit. This structure is in good condition. There is a 21 in. by 42 in slide gate at the base of the intake structure. This gate is operated by using a heavy chain connected to the gate to pull the gate open. The gate was submerged during the inspection and could not be observed.</p> | |
| OUTLET STRUCTURE | <p>There is an area downstream from the outlet pipe which has been scoured out by discharge through the outlet conduit. This area is about 5 ft. wide by 5 ft. deep by 5 ft. long.</p> | <p>The scoured-out downstream from the outlet conduit should be filled. The area should be protected to prevent recurrence of the problem.</p> |
| OUTLET CHANNEL | <p>The outlet channel is a natural channel which has an extremely mild slope. The channel is also overgrown with trees and is clogged with some debris. The combination of channel slope, dense vegetation, and debris cause water to pond along the downstream toe of the dam.</p> | <p>The outlet channel should be improved to prevent water from ponding along the toe of the dam.</p> |

UNGATED SPILLWAY - EMERGENCY SPILLWAY

Name of Dam: LAKE HOLLY DAM

VISUAL EXAMINATION OF OBSERVATIONS REMARKS OR RECOMMENDATIONS

EMERGENCY SPILLWAY

This is not applicable.

The approach to the emergency spillway consists of the mildly sloping natural ground and reservoir bottom.

The spillway providing access to the upstream reservoir passes through the emergency spillway and ends at the crest of the reservoir. The discharge channel is not well defined downstream from the crest.

Erosion protection should be installed to protect the emergency spillway from being eroded when it is activated.

INSTRUMENTATION

Name of Dam: LAFF HOLLY DAM

| VISUAL EXAMINATION | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|-----------------------|---------------------|----------------------------|
| MANUMENTATION/SURVEYS | None were observed. | |
| OBSERVATION WELLS | There were none. | |
| WEIRS | There were none. | |
| PIEZOMETERS | There were none. | |
| OTHER | There were none. | |

RESERVOIR

Name of Dam: LAKE HOLLY DAM

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

SLOPES

The reservoir slopes are mild. No signs of instability were observed during the inspection. The watershed surrounding the reservoir is primarily forested with some agricultural activities.

SEDIMENTATION

Sedimentation is not reported to be a significant problem. Soundings taken during the inspection indicate that the reservoir is approximately 10 ft. at a distance of 100 ft. from shore near the center of the embankment.

DOWNSTREAM CHANNEL

Name of Dam: LAKE HOLLY DAM

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|-----------------------|--------------|----------------------------|
|-----------------------|--------------|----------------------------|

CONDITION
(OBSTRUCTIONS,
DEBRIS, ETC.)

The downstream channel is mildly sloping
and overgrown with vegetation.

SLOPES

The channel has very mild slopes.

APPROXIMATE NO.
OF HOMES AND
POPULATION

The channel is overgrown with trees and
and contains some debris. The downstream
channel has very mild slopes. The stream
enters Thelma Pitts reservoir (I.D. No.
VA 03343) 800 ft. downstream. Approxi-
mately 200 ft. below Thelma Pitts reser-
voir, the stream passes under Virginia
Route 654 through a 4 ft. diameter cul-
vert. An additional 600 ft. downstream,
the channel passes through a 4 ft. dia-
meter culvert under the access road a
the Sparta Volunteer Fire Company.

APPENDIX IV
GENERAL REFERENCES

GENERAL REFERENCES

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9. U.S. Army, Hydrologic Engineering Center, "Flood Hydrograph Package (HEC-1), Dam Safety Investigations, Users Manual," Corps of Engineers, Davis, California, September 1978.
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NAME OF DAM: LAKE HOLLY DAM

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NAME OF DAM: LAKE HOLLY DAM

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